

# **Physico-chemical properties of innovative ionic liquids for electrochemical applications**

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Ionic liquids (ILs) are salts with melting temperatures below 100°C. ILs present peculiar physical and chemical properties: extremely low vapour pressure, high ionic conductivity, a high thermal, chemical and electrochemical stability, a high thermal capacity and good solvent capacity. Due to these peculiarities, ILs have been proposed for a large variety of applications in chemistry and physics, such as, for example, green solvents, electrolyte components for electrochemical devices, lubricants, ingredients for pharmaceuticals and heat exchangers. Due to the possible applications of such materials, it is of great importance to investigate their macroscopic physico-chemical properties and to correlate them with microscopic and structural properties.

In this work we investigated the decomposition and melting temperatures, the vapour pressure and electrochemical stability window of a few IL families based on the bis(trifluoromethanesulfonyl)imide or bis(fluorosulfonyl)imide anions and on quaternary ammonium or imidazolium cations. Moreover, DFT calculations on the different liquids were performed to study the occurrence of hydrogen bonding besides Coulomb attraction between anions and cations.

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